bigolden3

[en] - User manual, **[de]** - Betriebshandbuch, **[fr]** - Manuel d'utilisation, **[cz]** - Uživatelská příručka

[en]

bigolden3

User manual

Please read this manual carefully and keep its instruction in mind when using your Golden4 paraglider

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1. Introduction

Congratulations on buying your new GRADIENT BiGolden3! We believe that you will be very enthusiastic about its performance and flight characteristics and we are sure you will be fully satisfied with your new paraglider.

The BiGolden2 was introduced to the market at the start of 2009 and is still one of the best tandem gliders on the market. It took a rather long time to make a better tandem glider than the BiGolden2, but we are very happy we can say we have been successful!

The BiGolden3 is lighter, faster, more compact, has better handling and more performance. The canopy is designed from a well-proven combination of different materials: all Porcher Skytex premium quality. Reinforcements are made with nylon rods, which helps for better inflation and a clean leading edge. Line drag is reduced by using well-proven DC Dyneema lines. In combination with Edelrid Dyneema and aramid lines the result is an optimal balance of strength, durability and drag.

We are sure the BiGolden3 is a beautiful tandem glider with very nice handling; a truly worthy successor to the BiGolden2.

The BiGolden3 is certified EN-B/LTF-B and is meant for a large group of pilots: from hobby cross-country pilots to professional tandem pilots. Anyone in fact who wants exceptional safety and easy take-off and landing characteristics.

This manual will help you become familiar with your new paraglider and also provides information that will allow you to get the best from your glider and keep it in good condition. If you have any further questions after reading this booklet, please do not hesitate to contact our company or any authorised dealer and we will gladly answer all your questions.
When you have become familiar with your new BiGolden3 we would welcome any feedback that you might have.

2. Description

2.1. Technical description

The BiGolden3's improved profile means excellent aerodynamic efficiency. Its characteristics give the maximum resistance to premature airflow separation and optimal control forces.

For better distribution of forces within the canopy, diagonal segmented rib technology is used. These segmented ribs are anchored to the attachment points of the A, B and C lines and distribute forces to the inner-ribs. This enables the canopy to be divided into as few as thirteen carrying ribs on each side, while still retaining the correct aerofoil shape. Thanks to this, the BiGolden3 has fewer lines and therefore less drag. The result to the pilot of this reduced drag is a higher top speed and better glide angle. Diagonal segmented ribs (compared to non-segmented diagonals) also increase compactness and canopy stability, especially in terms of a glider's capacity to recover from an asymmetric collapse.

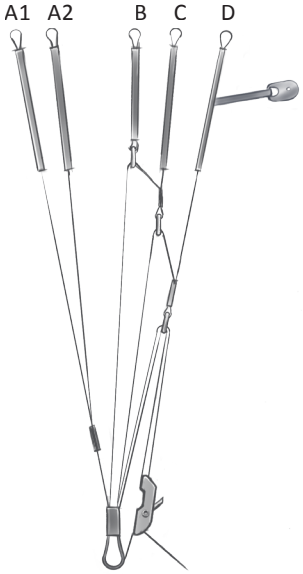
A new form of "partly triangle cell openings" helps to inflate the canopy across a wide range of angle of attack. Graduated-sized cell-openings reduce the air movements and aid pressure distribution within the glider.

Five rows of lines (A, B, C, D, E) are used for the upper suspension system. Rows D and E combine into main lines so a system of four risers can be used. This method helps to reduce drag and gives maximum simplicity, which pilots will appreciate especially during the pre-flight checks and on launch. The BiGolden3 is certified to be flown with risers with trimmers.

Careful selection of lines and materials means the wing-loading is optimised in flight in any situation. Progressive line diameters along the span and chord are already standard in Gradient wings.

A sophisticated combination of materials significantly helps to reduce weight of the glider (to 7.3 kg). The BiGolden3 is the first Gradient tandem glider where we have used Everlast, a double-coated Porcher material. Everlast was developed by Gradient in co-operation with Porcher Sport, and this exclusive material provides gliders with long-term stability and durability.

The BiGolden3 is supplied with a well-tried four-riser speed system with split A-risers and trimmers with a working range of 8cm.
The total length of the risers is only 35cm.

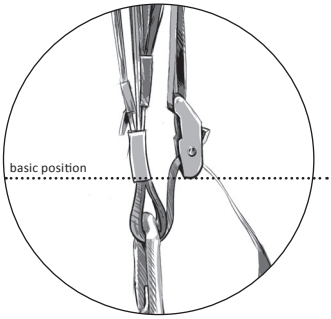


Length of the BiGolden3 risers (mm):

Size 39-42	A1,A2	B	C	D
Basic position	350	350	350	350
Slowed:	350	345	340	330
Accelerated:	350	360	375	410

2.2. Technical data

BiGolden 3		39	42
Flat Area	[m2]	38.96	41.19
Projected area	[m2]	33.40	35.32
Span	[m]	14.44	14.84
Projected span	[m]	11.62	11.96
Aspect ratio		5.35	5.35
Projected aspect ratio		4.04	4.05
Max. chord	[m]	3.35	3.45
Min. chord	[m]	0.705	0.725
Number of cells		57	57
Line consumption	[m]	449.7	462.4
Weight of the glider	[kg]	6.9	7.3
Take-off weight range	[kg]	120-190	140-220
Certification		EN B	EN B / LTF B



3.

2.3. Specifications of materials

Canopy	Fabric	Finish	Weight
Upper sail-leading edge	Skytex 40	Everlast	40 g/m2
Upper sail-rear part	Skytex 38	Universal	38 g/m2
Bottom sail	Skytex 32	Universal	32 g/m2
Ribs	Skytex 40	Hard	40 g/m2
Non-carrying ribs	Skytex 32	Hard	32 g/m2
Diagonals	Skytex 40 / Skytex 32	Hard / Hard	40 g/m2 / 32 g/m2
Reinforcements	Scrimm F02 420	X15A	180 g/m2
Reinforcements	060981450YET001	Sticky laminate	60 g/m2
Reinforcements	Hahl Nylon 6, 2/1200	Ø 2 mm	

Lines	Finish	Diameter	Strength	Material
Liros DC 100	uncovered	0.7 mm	100 daN	Dyneema
Liros DC 120	uncovered	0.8 mm	120 daN	Dyneema
Cousin Vectran 16140	uncovered	0.7 mm	80 daN	Vectran
Cousin Vectran 16330	uncovered	0.9 mm	100 daN	Vectran
Edelrid 7850-100	covered	1.1 mm	100 daN	Dyneema/PES
Edelrid 7850-130	covered	1.3 mm	130 daN	Dyneema/PES
Edelrid 7850-160	covered	1.4 mm	160 daN	Dyneema/PES
Edelrid 7850-200	covered	1.6 mm	200 daN	Dyneema/PES
Edelrid 7343-190	covered	1.5 mm	190 daN	Aramid/PES
Edelrid 7343-230	covered	1.8 mm	240 daN	Aramid/PES
Edelrid 7343-280	covered	2.0 mm	280 daN	Aramid/PES
Edelrid 7343-340	covered	2.1 mm	280 daN	Aramid/PES
Edelrid 7343-420	covered	2.2 mm	280 daN	Aramid/PES
Risers	**Fabric code**	**Width**	**Strength**	**Material**
Webbing		15 mm	850 daN	PAD
Webbing		22 mm	1250 daN	PAD
Pulleys	Parafly			Al
Pulleys	Rilay			PAD
Karabiners	Maillon Rapide	Ø 3.5 mm	750 daN	Steel

3. Certification

The BiGolden3 has passed European certification EN/LTF in category B in both sizes 39 and 42. The EN certificate of each BiGolden3 is found on the rib in the middle of canopy.

NOTICE: The BiGolden3 is constructed for hill or tow launches. Use of a subsidiary motor has not been tested for by the manufacturer or by the Para-test!

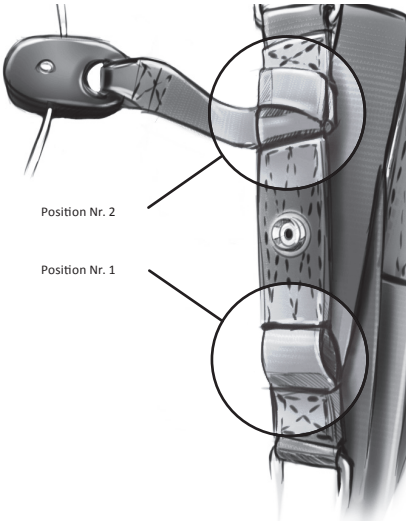
This glider is not meant for jumping from a plane, balloon or for jumps with a delayed opening of the canopy!

4. Adjusting your glider

Every BiGolden3, before it is given to a customer, goes through a final check-up and test-flight to verify that its characteristics and measurements correspond to the manufacturer's specifications. You may only make adjustments to the brake line lengths and only then in keeping with the recommendations of this manual.
Other adjustments or changes to your BiGolden3 lead to a loss of guarantee, airworthiness and validity of the European certification. Amateur modification may endanger yourself and other pilots. If you do have any suggestions for improvements let us know and our test-pilots will try out your ideas without risk to yourself.

4.1. Brake line adjustment

The BiGolden3 risers have optional positions for the guide pulleys for the main control lines to suit each pilot's physical build, harness hangpoints, or style of flying. As standard pulleys are placed on the upper position – see the picture – which fits most cases.



When you receive your new BiGolden3 the brake line-length is adjusted to be the same as that used during the tests. This length should suit most pilots and is indicated on the main control line.

It is of course possible to adjust the brake line length to suit each pilot's preference. We recommend that you act wisely when adjusting brake line length and change the length in small successive steps.

If you need to adjust brakes back to the basic position and the marks on the main brake lines are vague, for the BiGolden3 42 use lengths 302 cm and for the BiGolden3 39 use 294 cm.

Brake lines that are too short:
1) may lead to fatigue from flying with your hands in an unnatural position,
2) will impede recovery from certain unstable maneuvers and
3) will certainly reduce your glider's speed range.

Brakes that are too long will:
a) hamper pilot control during launch
b) reduce control in extreme flying situations
c) make it difficult to execute a good flare when landing.

Each brake line should be tied securely to its control handle. Only use knots that will guarantee this, such as a Dragon's Knot.

5. Flight operations

This manual is intended as a guide to the characteristic features of your new BiGolden3 paraglider. Under no circumstances should it be thought of as a “learn-to-fly” manual for paragliding, or as a substitute for a paragliding pilots training course.

5.1 Standard flight regime

5.1.1 Pre-flight check

A thorough pre-flight check is essential for safe flying and that’s why you should pay special attention to it. Above all you should check that the canopy, lines and risers are free from damage and tangles. Also don’t forget about your harness and your reserve parachute.

Before the launch spread the canopy out into a slight arc and check that:
all cell openings are free
no lines are looped around or under the canopy
no lines are tangled or have a knot on them
any twigs, grass or other objects are not entangled in the lines or the canopy
risers are not twisted
control lines run freely through the pulleys
knots on control handles are secure
carabiners on risers are tightened
trimmers on both sides are equally adjusted.

5.1.2 Launch

Launching the BiGolden3 is straightforward, either by front launch or by reverse launch. A dynamic pull of the front risers (A-risers) will bring the canopy simply and easily above the pilot’s head. The canopy inflates from the centre equally and smoothly. The BiGolden3 has no tendency to outrun the pilot and quickly stabilises above the pilot. Don’t forget to visually check the canopy and its lines before launching.

Take off can be made easier by a light pull on the brakes.
The BiGolden3 requires no modification or particular manoeuvre for launching by winch.

5.1.3 Flight

When the trimmers are adjusted to the Basic position – where the bottom edge of the trimmer is at the bottom edge of the main bandage – and brakes are loose, the BiGolden3 is trimmed to fly at best glide angle.

The best sink rate is produced with trimmers closed (pulled down) and both control lines drawn down evenly to about 20%-25% of their range.

When the trimmers are fully open, the BiGolden3 is trimmed to fly at max speed.

Flying in turbulent conditions

When flying through severe turbulence it is recommended that the canopy is stabilised by simultaneously applying a little brake to both sides. Flying with a little brake applied will also help to prevent deflations and allow you to get more feedback from your glider. Responding correctly to the paraglider’s movements by means of the brakes and weightshift is known as “active flying”. A pilot demonstrating good active flying skills will significantly reduce both the number and severity of collapses he or she experiences.

Turning

The BiGolden3 is very comfortable and pleasant in turns. The handling characteristics are very responsive and accurate and demand no special habits or non-standard procedures.

When developing the BiGolden3 special attention was devoted to the control forces required to manoeuvre the paraglider. The result is that the brake travel and force has been

optimised. In flight the control forces are firm but responsive and precise and allow for perfect communication with the canopy. Brake pressure is reassuringly progressive.

5.1.4 Landing

Landing with the BiGolden3 is very simple. On your first flights you may be surprised at just how well it glides. Take account of this when making your landing approach! Facing into wind, at about one metre above the ground, pull down the brakes all the way. Under zero-wind conditions, or if forced to make an emergency landing downwind you may prefer to take a wrap of each control line so as to enable a more dynamic flare.

5.2. Rapid descent

Every pilot will sooner or later be in a position when he/she has to quickly decrease his/her altitude. This situation may come about as the result of a sudden and unexpected change in the weather, reaching cloudbase and not wishing to enter cloud, or simply because you need to finish your flight quickly. There are three main methods for achieving a rapid descent: Big Ears, B-stall and Spiral dive.

5.2.1 Big Ears

This is the easiest technique for a rapid descent. Depending on how much of the wing tip you deflate you will achieve 3 to 6m/s sink rate.

Initiation: Take hold of the outer A-lines on both sides as high as possible and pull them down fluently and hold them firmly. The effective area of the paraglider is reduced equally on both sides of the wing. The size of the deflated area depends on how deeply the lines are pulled down. Be sure to pull both sides equally.

Recovery: Under normal circumstances the BiGolden3 opens automatically when the A-lines are released. The opening may be accelerated by gently and repeatedly braking symmetrically on both sides (slightly “pumping” the brakes).

5.2.2 B-line stall

B-line stall can be used on BiGolden3. This flight technique is a very effective way of making a rapid descent, but on account of the compactness of canopy and small lengths of risers, it is not very simple. Depending on how much the B-risers are pulled down, the sink rate is between 6m/s and 10m/s.

Initiation: Take hold of the B-risers at the top and smoothly pull them down until the canopy shows a spanwise crease where the B-lines attach to the sail. Your sink rate will increase considerably while your forward speed will decrease to practically zero. Don’t be startled when the airflow over the top surface is detached and the canopy enters a parachutal stall without moving forward. It will soon stabilise above your head.

Recovery: On releasing the B-risers the BiGolden3 automatically returns to normal flight without staying in deepstall (sackflug) or shooting in front of the pilot. Let go of the risers smoothly and symmetrically.

Caution: If the B-risers are released unevenly the canopy could enter a turn on release from the B-stall. If the risers are released slowly and very unevenly it could start a spin.

5.2.3 Spiral dive

The spiral dive is the most effective way of making a fast descent. Every pilot should be able to perform a spiral dive and one day you may need to. Always be aware of your altitude, which decreases very rapidly during a spiral dive. The sink rate reached in a spiral dive anbe more than 20m/s!

Initiation: Smoothly pull on one brake so that the glider goes from a normal 360-degree turn into a steep turn and from there into a spiral dive. The transition into a spiral dive can be

made easier by weight shifting to the inner side of the turn. Keep an eye on the tension of the control line all the time – reduced tension signalises an overload of the glider and danger of falling into a negative spin.

Recovery: The BiGolden3 recovers from a spiral automatically as soon as the brakes are released. Release them smoothly and always finish a spiral dive with safe altitude!

5.3 SIV maneuvers

No matter what category of canopy you fly or what level of certification it has, in turbulence or in strong thermals you may experience all kinds of collapses. The BiGolden3 behaves comfortably in these situations, indeed not only does the BiGolden3 deal with extreme flight regimes automatically, but also offers an above-average degree of safety. Even so, you must follow all safety rules when practising special flight operations and always pay attention to your altitude!

Before performing special flight regimes remember:
Practise reserve deployment on the ground, in a simulator, so that reserve deployment is automatic and efficient.

Rapid altitude loss and considerable rotational forces may develop during unstable maneuvers. Take account of these factors in the context of reserve deployment

5.3.1. Asymmetric collapse

Initiation: Take hold of the outer A-lines on one side and pull them down smoothly. The wing tip will collapse downward forming a characteristic 'big ear'. The size of the ear depends on the depth to which the lines are pulled as well as the number of lines pulled down. You can stop any tendency to turn by applying the opposite brake and by weight shifting onto the inflated side of the canopy.

Recovery: Under normal conditions the BiGolden3 will re-inflate spontaneously when the pulled lines are released. The inflation time and loss of altitude can be reduced by suitable action of the pilot. To stop any tendency to turn off course pull the brake on the inflated side (be careful not to overreact and stall the inflated side) and weightshift to that side. If the collapse remains then reinflate the collapsed side by 'pumping' the brake on the collapsed side to quicken the inflation.

5.3.2. Frontal collapse

Initiation: Take hold at the top of both A-risers and pull them down until the leading edge collapses.

Recovery: In normal conditions the BiGolden3 recovers normal flight automatically as soon as the front risers are released. Opening may be assisted by applying both brakes simultaneously to pump out the deflation.

5.3.3. Deep stall ("sackflug")

Initiation: Pull both brakes smoothly until the sink rate increases markedly and the forward speed reaches almost zero. The pull on the brakes should be controlled so that the canopy stays inflated and doesn't fall back into a full stall.

Recovery: The BiGolden3 cannot stay in this regime of deep stall flight, so after the brakes are released the glider automatically returns to normal flight. If you need to, you may accelerate the recovery of the glider by one of two methods: either pump both brakes deeply with a fast release, or pull lightly on the A-risers.

Caution: If you pull too sharply on the A-risers you may experience a front collapse.

5.3.4 Negative spin

Initiation: Slow down by braking to nearly minimum speed. Then pull a brake on one side all the way down while simultaneously releasing the brake on the other side. Because the stalled side falls back, the canopy suffers airflow separation over one half of the wing which results in a spin and a rapid loss of altitude.

Recovery: Under normal circumstances the BiGolden3 is capable of recovering from a negative spin automatically when the brakes are released.

Caution: In general when there is a very fast or a long-lasting rotation and when the brakes are released too quickly, the canopy may shoot in front of the pilot followed by a massive asymmetrical collapse.

Warning: In all regimes where the air flow is separated there is always a rapid increase in sink rate and therefore a substantial loss of altitude.

And remember: A wrong manoeuvre at the wrong time may change a fairly easy situation into a dangerous problem. Furthermore you are exposing your glider to forces which may damage it. So practise your piloting abilities for these special flight regimes only under the supervision of your instructor and with a reserve parachute.

6. Maintanence and storage

If you handle your glider with care and store it in a suitable place it can last you a very long time. On the other hand neglecting maintenance, bad storage and the use of unsuitable cleaning products can reduce the lifetime of your glider significantly or may even make it dangerous.

You must keep to these rules:

Choose a suitable area for your launches. Lines caught on roots or rocks lead to unnecessary strains on the attachment tabs during inflation. Snagging lines may rip the canopy tissue or damage lines.

When landing, never let the canopy fall on its leading edge in front of the pilot. The effect of these forceful collisions and the sudden pressure increase can severely damage the air resistant coating of the canopy as well as weakening the ribs and seams.

Protect the canopy from unnecessary strain. Inconsiderate handling of your glider, namely pulling it over grass, soil, sand or even over rocks, will significantly reduce its lifetime and increase its air-porosity.

When preparing the paraglider for a launch or when ground handling, be sure not to step on any of the lines or the canopy.

Don’t tie any unnecessary knots in the lines. A packing method where special knots are made in the lines as used on parachutes and reserve parachutes aren’t suitable for packing the lines used on paragliders.

Protect your canopy and lines from unnecessary exposure to sunlight. UV-rays can damage many parts of a paraglider.

Try not to pack your glider when wet. If there’s no other way then dry it as soon as possible but away from direct sunlight.

Don’t let your glider come into contact with sea water. If it does, rinse (the lines, canopy and risers) with fresh water and dry before storing.

After flight or when storing, always use the inner protection sack.

When storing or during transport make sure your glider isn’t exposed to temperatures higher than 50 degrees Celsius.

Never let the glider come into contact with chemicals. Clean the paraglider with clean lukewarm water only.

For long-term storage don't pack the glider too tightly and store it in a cold, dry and well-ventilated room.
After tree- or water landings always examine the glider carefully. If you suspect that the flight features of your paraglider have changed, contact the nearest authorised GRADIENT supplier as soon as possible.

After 200 flying hours or after two years at the latest your BiGolden3 must be thoroughly checked and tested by the manufacturer or an authorised Gradient service centre.

7. Repairs

Only small repairs may be done by the user, which means repairs that don't change the airworthiness of the paraglider. Among these are fixing small tears (besides seams) up to 10cm, changing damaged lines or the change of rubber line-fixation-rings on the small carabiners.

When repairing your paraglider on your own keep the following rules:
When repairing the sail use the self-adhesive patches specified for this purpose. Every BiGolden3 comes with a repair kit.
The only admissible repairs done on lines are those where the damaged lines are changed for new ones exclusively supplied by the manufacturer of BiGolden3, authorised dealer or service. When ordering new lines use code indicators given in the attached diagram of suspension lines. Also give the indicator "BiG3" (BiGolden3) and the size of the canopy of your glider, i.e.
BiG2 42, followed by the line code; for example:

- The outside long line in line A for BiGolden3 42: BiG3 42 A 1.3

An exception is changing a control line while out flying. For this purpose the manufacturer encloses a spare line with every BiGolden3 with a prepared loop on one end. The right length should be adjusted according to the same line on the opposite side of the canopy and then attach your brake handle. As soon as you can, swap the line for an original one from your authorised GRADIENT service centre.

After any changing of lines a thorough pre-flight check must be done. Don't hesitate to ask your instructor or an experienced colleague for help. If you're not sure, entrust the job to either the manufacturer or an authorised GRADIENT dealer.

If you have to replace any of the line-tidy rings (a spare ring is supplied with each BiGolden3). Don't forget to check that the lines haven't been swapped accidentally and that they are returned to the small karabiner in the correct order.

8. Conclusion

Even though the BiGolden3 has outstanding performance and stability, it must be understood that even the safest paraglider is an aircraft and that all air-sports can be relatively dangerous.

Remember that not only your safety but your passenger's too lies in your hands.

Never underestimate weather conditions and never forget that you are flying for pleasure and not to become a 'fallen hero'. Remember this and the fun that only free-flying can bring will be yours.

We believe that your sensible attitude and the flight characteristics of your
BiGolden3 will combine to ensure you fantastic flying.

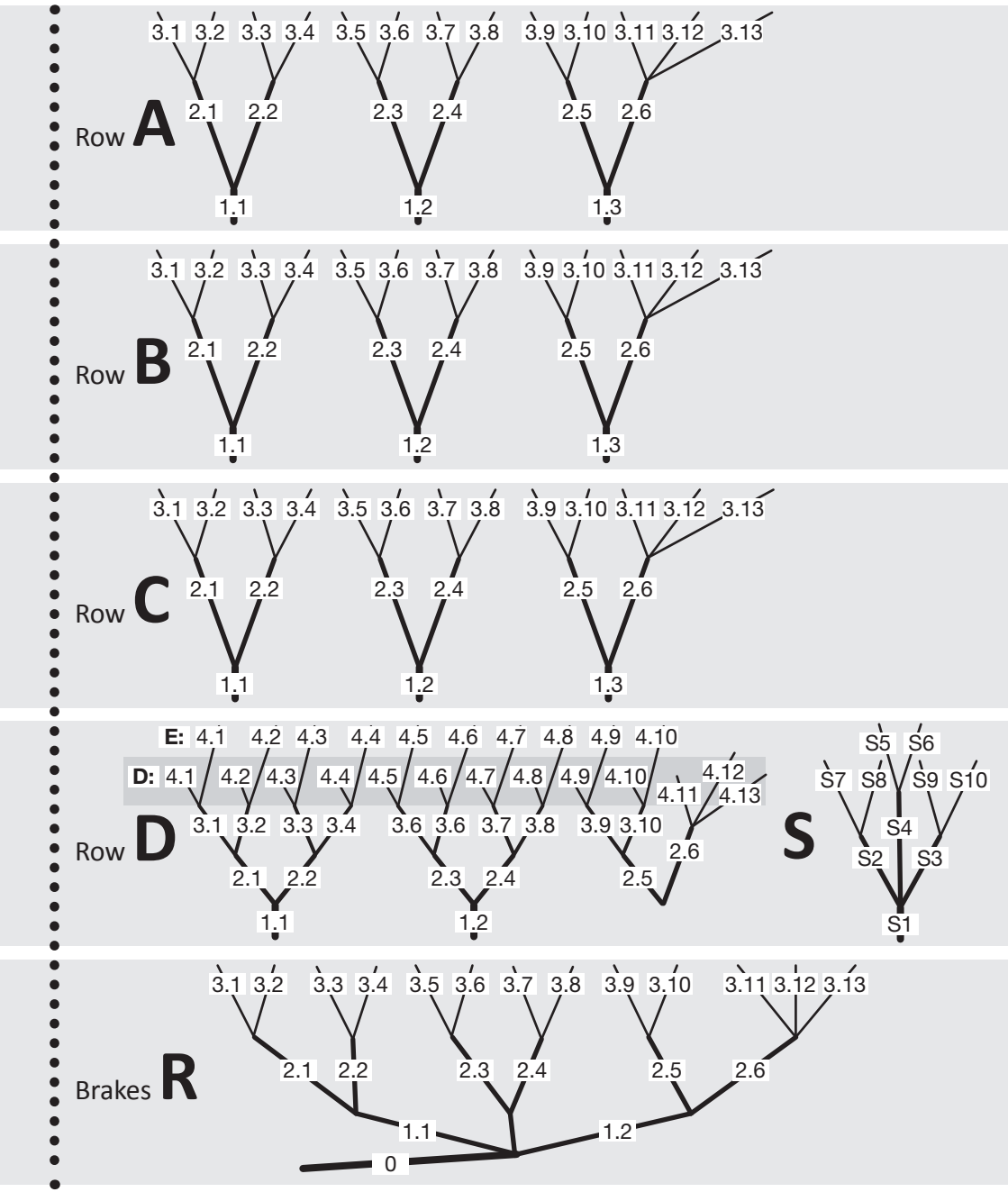
GRADIENT wishes you many fabulous flights and happy landings.

Ondřej Dupal
Director

Václav Sýkora
Designer

10. Gradient BiGolden3 – Line Map

Middle of the cannopy



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